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Title: *Planetary Magnetosphere Configurations*

Cluster: *Cross-Theme Theory and Data Analysis/SECTP*

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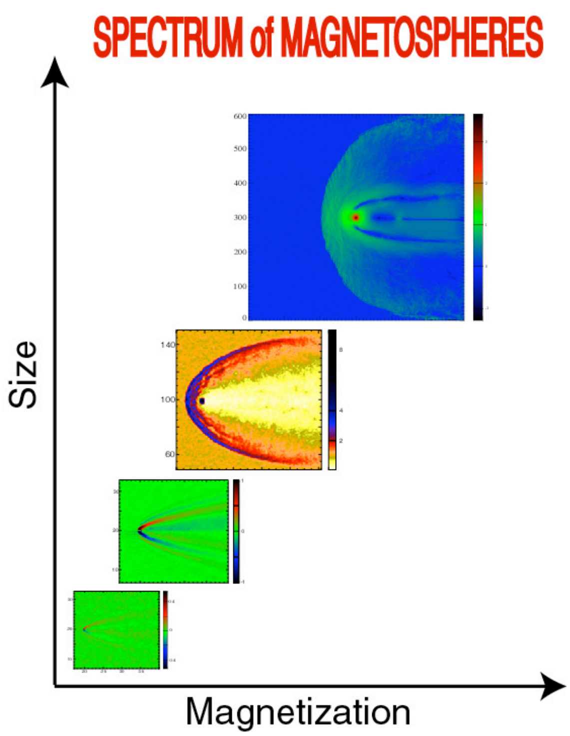
- **Magnetosphere Topology of Solar System Bodies Changes Predictably with the Magnitude of the Internal Magnetization**

On its journey from the Sun to the outer heliosphere, the solar wind encounters planets and asteroids with varying degrees of internal magnetization. It had been assumed that this encounter results either in the formation of an Earth-like magnetosphere or that no magnetosphere forms. However, a study by the UCSD SECTP group of the solar wind interaction with magnetic dipoles of varying strengths has now demonstrated that a spectrum of global magnetosphere structures occur, with the spatial extents and the structural complexities changing in a predictable way with increasing magnetization. At one end of the spectrum the interaction results in a simple wake. With increasing magnetization, more complexity evolves with the formation of additional wakes and bow waves, eventually leading to a terrestrial-like magnetosphere with a bow shock, magnetopause, cusp and magnetotail. The transition into a terrestrial-like configuration occurs at a dipole strength near but smaller than that of Mercury.

This result contributes to the NRC Decadal Research Strategy in Solar and Space Physics challenge to understand the space environments of Earth and other solar system bodies and their dynamic response to external influences. It also provides a tool for the determination of magnetization levels of asteroids from spacecraft flyby measurements.

Magnetospheres become larger and more complex with increasing internal magnetization.

(The colored inserts are plots of magnetic field strengths relative to that in the upstream solar wind.)



Omidi, N., X. Blanco-Cano, C. T. Russell, and H. Karimabadi, “Dipolar magnetospheres and their characterization as a function of magnetic moment”, *Adv. Space Res.*, in press, 2004.